

Patent Claims:

1. A thermo-hydrodynamic force amplifier ("THFA"), ***characterized in that*** a liquid is cyclically displaced from hot to cold and vice-versa
5 within a rigid cylinder by means of an auxiliary piston through a heater-generator-cooler arrangement or a heater-recuperator-cooler arrangement and that the dynamic force exerted as a result thereof by the thermally also cyclically contracting and expanding column of liquid is greater than the driving power of the auxiliary piston.
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2. The THFA as set forth in claim 1, ***characterized in that*** the energy released by the thermal expansion of the liquid is converted into useful mechanical work through suited technical devices.
- 15 3. The THFA as set forth in claim 1 and 2, ***characterized in that*** the thermally expanding liquid cyclically flows through a hydraulic engine, generating rotational energy at its shaft.
4. The THFA as set forth in claim 1 and 3, ***characterized in that*** an
20 expansion tank that is pressurized to atmospheric pressure or to a slightly elevated pressure is mounted downstream of the hydraulic engine.
5. The THFA as set forth in claims 1 through 4, ***characterized in that***
25 the pressure generated by the expanding column of liquid is

regulated both in terms of time and quantity by a switchable shut-off element.

6. The THFA as set forth in claims 1 through 5, *characterized in that*
 5 the desired liquid pressure achieved is defined either by the ratio of the volume flow of the expanding liquid to the absorption volume of the hydraulic engine or by a combination of this effect with the regulatable shut-off element of claim 5.
- 10 7. The THFA as set forth in claims 1 through 6, *characterized in that* the fluid produces work during expansion, said fluid being expanded to ambient pressure or to a but slightly elevated pressure and returning the fluid to its initial condition being achieved through contraction using a reversible cooling procedure.
- 15 8. The THFA as set forth in claims 1 through 7, *characterized in that* the liquid, which is subjected to expansion and contraction, is at the same time the hydraulic liquid of the hydraulic engine.
- 20 9. The THFA as set forth in claims 1 through 6, *characterized in that* different media are utilized for the working and the hydraulic liquid, said media being separated from one another by an elastic element.
- 25 10. The THFA as set forth in claims 1 through 9, *characterized in that*, in order to minimize the hydrodynamic friction generated during

displacement of the working liquid, the cross sections of flow through the heater, the regenerator-recuperator, the cooler are matched to the temperature-viscosity behaviour of the working liquid.

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11. The THFA as set forth in claims 1 through 10, *characterized in that* the oscillating linear force generated by the expanding column of liquid is coupled directly, without converting into rotational energy, to linear motion energy converters by interposing suited pressure conformators for compressing air, for generating pressure in reverse osmosis systems, for operating cold compressors and the like.

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12. The THFA as set forth in claims 1 through 11, *characterized in that* a machine fitted with a pressure conformator and with a linear pressureless coupling is operated with external power and functions as a refrigerator heat pump.

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13. The THFA as set forth in claim 12, *characterized in that* the driving power consists of a THFA driving machine.

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14. The THFA as set forth in claims 1 through 10, *characterized in that* the refrigerator heat pump is realized by a one-cylinder arrangement in which a THFA machine operating in the hot part of the cylinder serves as a pressure pulsator, whereas a second THFA machine operating out-of-phase in the cold part of the cylinder and

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performing the cycle in reverse operates as the refrigerator heat pump.

15. The THFA as set forth in claims 1 through 10, *characterized in that*
5 a plurality of cylinders that are driven out-of-phase with each other in terms of time permit to smooth the power supply.
16. The THFA as set forth in claim 15, *characterized in that*, in the case
of multiple cylinder arrangements, the regenerators may be replaced
10 by reverse flow heat exchangers interposed between the cylinders.
17. A THFA, *characterized in that* a liquid enclosed in a working
cylinder is cyclically displaced between a hot and a cold source
through a heat regenerator by means of a displacer piston and that the
15 expansion volume flow building up under pressure during heating is converted into mechanical rotational energy by a hydraulic engine connected downstream thereof, with the liquid, after having delivered its work to the engine, being regeneratively cooled down again in the regenerator, thus reducing in volume so as to fit back
20 into the working cylinder.
18. A THFA, *characterized in that* a liquid enclosed in a working
cylinder is penetrated by a regenerator reciprocating between a hot
and a cold source and that the expansion volume flow building up
25 under pressure during heating is converted into mechanical rotational

energy by a hydraulic engine connected downstream thereof, with the liquid, after having delivered its work to the engine, being regeneratively cooled down again in the regenerator, thus reducing in volume so as to fit back into the working cylinder.

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19. A THFA, *characterized in that* a liquid is regeneratively heated and then cooled down again in cycles so that the expanding pressure volume flow generated by heating performs mechanical work in a working machine and that the volume contraction occurring during
10 subsequent cooling causes the liquid to return to the initial point of a cyclic thermodynamic process.